

SECTION C — ( $3 \times 10 = 30$  marks)

Answer any THREE questions.

16. Fit a second degree parabola to the data.

$x$	1929	1930	1931	1932	1933	1934	1935
$f(x)$	352	356	357	358	360	361	361

17. Find a real root of  $x^3 + 2x^2 + 50x + 7 = 0$  using Newton-Raphson method.

18. Solve by triangularization method the following systems.  $5x - 2y + z = 4$ ;  $7x + y - 5z = 8$ ;  $3x + 7y + 4z = 10$ .

19. Find the values of  $y$  at  $x = 21$  and  $x = 28$  from the following data.

$x$	20	23	26	29
$y$	0.342	0.3907	0.4384	0.4848

20. From the following table estimate  $e^{0.644}$  correct to 4 decimal places using Bessels's formula.

$x$	0.61	0.62	0.63	0.64	0.65	0.66	0.67
$e^x$	1.8404	1.8598	1.8776	1.8965	1.9155	1.9348	1.9542

APRIL/MAY 2024

23UECA12B/23UEDA12B/23UECS12A/  
23UESC12A — NUMERICAL METHODS

Time : Three hours

Maximum : 75 marks



SECTION A — ( $10 \times 2 = 20$  marks)

Answer ALL questions.

- Write the general equation of the straight line.
- Write the error committed when we fit a parabola by the method of least square.
- State the condition of convergence of the iterative method.
- Write the formula for Regula-Falsi method.
- For solving a linear system compare the Gauss Jacobi method and Gauss Seidal method.
- State a sufficient condition for Gauss Seidal method to converge.
- Express  $x^3 + x^2 + x + 1$  in factorial polynomial.
- Prove that  $E = 1 + \Delta$ .



9. Write the advantages of central difference interpolation formula.

10. Write Stirling's formula for the central difference.

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) From the table given below, find the best values of  $a$  and  $b$  in the law  $y = ae^{bx}$  by the method of least squares.

$x$	0	5	8	12	20
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$f(x)$	3	1.5	1	0.55	0.18
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Or

(b) Fit a straight line to the data given below. Also estimate the value of  $y$  (2.5).

$x$	0	1	2	3	4
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$f(x)$	1	1.8	3.3	4.5	6.3
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12. (a) Find the real root of the equation  $\cos x = 3x - 1$  correct to 3 decimal places.

Or

(b) Solve for a positive root of  $x^3 - 4x + 1 = 0$  by Regula-Falsi method.

13. (a) Solve the system of equations by Gauss Jordan method.  $2x + 3y + 3z = 10$ ;  
 $x + 2y + z = 3$ ;  $3x - y + 2z = 13$ .

Or

(b) Solve the following system of equations by using the Gauss-Seidal method correct to 3 decimal places.  $10x - 5y - 2z = 3$ ;  
 $4x - 10y + 3z = -3$ ;  $x + 6y + 10z = -3$ .

14. (a) Find  $\Delta^3 f(x)$  if  $f(x) = (3x+1)(3x+4)(3x+7) \dots (3x+19)$ .

Or

(b) Find the 7<sup>th</sup> term of the sequence 2, 9, 28, 65, 126, 217 and also find the general term.

15. (a) Apply Gauss's forward central difference formula and estimate  $f(32)$  from the following table:

$x$	25	30	35	40
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$f(x)$	0.2707	0.3027	0.3386	0.3794
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Or

(b) Using Stirling's formula, estimate  $f(12)$  from the following table.

$x$	5	10	15	20
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$f(x)$	54.14	60.54	67.72	75.88
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